Record of Decision
for Site 7
Naval Air Station, Brunswick, Maine

Contract No. N62472-92-D-1296
Contract Task Order No. 0082

Prepared for

Department of the Navy
Engineering Field Activity Northeast
Naval Facilities Engineering Command
10 Industrial Highway
Mail Stop No. 82
Lester, Pennsylvania 19113-2090

Prepared by

EA Engineering, Science, and Technology
The Maple Building
3 Washington Center
Newburgh, New York 12550

September 2002
FINAL
296.0082

EA Engineering, Science, and Technology

The Maple Building
3 Washington Center
Newburgh, NY 12550
Telephone: 845-565-8100
Fax: 845-565-8203

25 September 2002

Mr. Michael Barry
U.S. Environmental Protection Agency
New England – Region 1
1 Congress Street, Suite 1100 (HBT)
Boston, Massachusetts 02114-2023

Ms. Claudia Sait and
Ms. Denise Messier
Maine Department of Environmental Protection
State House, Station 17
Augusta, Maine 04333-0017

RE: Final Record of Decision for Site 7 (Old Acid/Caustic Pit)
at Naval Air Station Brunswick, Maine
Contract No. N62472-92-D-1296; Contract Task Order No. 0082
EA Project No. 29600.82

Dear Mr. Barry, Ms. Sait, and Ms. Messier:

On behalf of the Department of the Navy, EA Engineering, Science, and Technology is pleased to submit the final Record of Decision for Site 7 (Old Acid/Caustic Pit) at the Naval Air Station Brunswick for your review and signature.

If you have any questions, please do not hesitate to contact me at (781) 275-8846, Extension 209.

Sincerely,

Alexander Easterday

Alexander C. Easterday, P.G.
CTO Manager

ACE/caw
Enclosure

cc: L. Monaco (EFANE)
A. Williams (NAS Brunswick)
C. Lepage (Lepage Environmental)

CONTENTS

Page

Page

Page

Page

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

ARAR	Applicable or relevant and appropriate requirement
bgs	Below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986
COC	Contaminants of concern
EPA	(U.S.) Environmental Protection Agency
MCL	Maximum Contaminant Level
MEDEP	Maine Department of Environmental Protection
MEG	Maximum Exposure Guideline
NAS	Naval Air Station
PAH	Polycyclic aromatic hydrocarbon
RAB	Restoration Advisory Board
ROD	Record of Decision
TRC	Technical Review Committee

PART 1—DECLARATION

I. SITE NAME AND LOCATION

Naval Air Station Brunswick
CERCLIS ID NO.: OU7-SITE7-ME8170022018
Site 7, Old Acid Caustic Pit
Brunswick, Maine

II. STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for Site 7, the Old Acid Caustic Pit Site, at the Naval Air Station (NAS) Brunswick. This remedial action was selected in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision is based on information documented in the Administrative Record that can be viewed by the public at the Public Works Office at NAS Brunswick or at the Curtis Memorial Library on McKeen Street, Brunswick, Maine.

The State of Maine Department of Environmental Protection (MEDEP) concurs with the selected remedy.

III. ASSESSMENT OF THE SITE

The response action selected in this Record of Decision (ROD) is necessary to protect the public health, welfare, or the environment from actual or threatened releases of hazardous substances into the environment.

IV. DESCRIPTION OF SELECTED REMEDY

The selected remedy for Site 7 is institutional controls with groundwater monitoring. The following major components of the selected remedy are needed to address soil and groundwater contamination at Site 7:

- Implement institutional controls, such as land use restrictions, to prevent human contact with and use of the soil and groundwater at the site.

- Conduct long-term monitoring of groundwater to verify that the contamination remains localized and to monitor the trend of contamination until it is consistently below the Federal Maximum Contaminant Level (MCL) and State Maximum Exposure Guideline (MEG).

- Reduction in the toxicity and volume of contaminants will occur as a result of the remedy's reliance upon the natural attenuation process. However, natural attenuation is not considered active treatment, and an alternative that relies upon natural attenuation does not meet the statutory preference for treatment under CERCLA.

- Perform five-year reviews.

It should be noted that no active sources of contamination have been identified at Site 7. The threat of consumption of contaminated groundwater is not immediate, as groundwater at Site 7 is neither a source of drinking water nor a significant potential future source of drinking water. To date, no evidence of movement of contaminants of concern (COCs) from Site 7 above Federal MCLs or State MEGs has been detected. Therefore, the selected remedy does not employ source treatment or containment activities.

The selected remedy addresses the inorganic contamination (cadmium and manganese) at Site 7 by conducting long-term monitoring of the contamination concentrations and by implementing institutional controls. The manganese detected at Site 7 could potentially be the result of past site activities, or anthropogenic. The presence of manganese in groundwater throughout Maine, including NAS Brunswick, is a common occurrence since manganese is a naturally occurring mineral and, therefore, its presence can be related to natural conditions at the site. The current remedy addresses both cadmium and manganese and, therefore, the presence of manganese does not alter the selected remedy. If the Navy can demonstrate that the level of manganese at Site 7 is similar to that of naturally occurring background range at NAS Brunswick, then the Navy will propose removing it as a COC for this site.

Beginning in Fiscal Year 2003, the Navy will evaluate different technologies, i.e., phytoremediation or groundwater neutralization, to optimize the groundwater remedy at Site 7 in order to accelerate the closure of this site. The Navy will report the findings to the U.S. Environmental Protection Agency (EPA), MEDEP, and the Restoration Advisory Board (RAB) for discussion.

V. STATUTORY DETERMINATIONS

The remedy selected for Site 7 satisfies the statutory requirements of Section 121(b)(1) of CERCLA in that it is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective.

Several investigations have been conducted to best define the nature and extent of cadmium and manganese contamination at the site. After defining this area, a removal action was conducted in an attempt to close out the site with no further action; however, cadmium concentrations in groundwater still remain above the Federal MCL and State MEG of 5 ppb. The remedial action resulted in the excavation of approximately 400 yd^3 of material, of which approximately 140 yd^3 were removed, transported, and disposed of at a licensed disposal facility. The remaining volume of non-hazardous soil was spread across the surface of the site. The groundwater at the

site is presently not used for a potable supply and there are no future use plans for withdrawing groundwater at the site for this purpose. Due to the small isolated area of groundwater contamination and since the groundwater is neither a present nor a significant potential future drinking water source, it was determined that institutional controls with monitoring would be protective and more cost effective. Given the low levels of the contaminants detected and the extensive source area removal conducted, it is expected that the cadmium and manganese will naturally attenuate and that monitoring will not be a long-term requirement. However, the remedy at this site does not satisfy the statutory preference for treatment as a principal element of the remedy.

This remedy will result in hazardous substances remaining onsite above levels that allow for unlimited use and unrestricted exposure. As a result, a review will be conducted within 5 years after the initiation of remedial action and at least once every 5 years thereafter, per the Federal Facility Agreement, to ensure that the remedy continues to provide adequate protection of human health and the environment. The five-year review process shall remain effective until institutional controls are no longer required at the site.

VI. RECORD OF DECISION DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary (Part 2) section of this ROD. Additional information can be found in the Administrative Record file for this site.

- COCs and their respective concentrations
- Baseline risks represented by the COCs
- Cleanup levels established for COCs and the basis for the levels
- Present and future land and groundwater use assumptions used in the baseline risk assessment and ROD
- Land and groundwater use that will be allowed at the site as a result of the selected remedy
- Estimated capital, operation and maintenance, and total present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected
- Decisive factor(s) that led to selecting the remedy including cost, practicability, and implementability.

VII. AUTHORIZING SIGNATURES AND SUPPORT AGENCY ACCEPTANCE OF REMEDY

This ROD represents the selected remedial action for Site 7 at NAS, Brunswick, Maine.

Concur and recommend for immediate implementation.

Department of the Navy

By: Robert S. Winneg Date: 26 SEPT 02

Robert S. Winneg, Captain
Commanding Officer
Naval Air Station Brunswick
U.S. Department of the Navy

U.S. Environmental Protection Agency

By: FOR RC Date: 9/27/02

Richard Cavagnero, Acting Division Director
Office of Site Remediation and Restoration
Region 1

PART 2—DECISION SUMMARY

I. SITE NAME, LOCATION, AND BRIEF DESCRIPTION

A. Name and Location

NAS Brunswick is located in Brunswick, Maine, south of the Androscoggin River and south of Route 1 between Routes 24 and 123 (Figure 2-1). The old acid caustic pit site (Site 7), addressed in this ROD, is located in the northern portion of NAS Brunswick northeast of the Old Navy Fuel Farm site and west of Fitch Avenue (Figure 2-2).

B. Comprehensive Environmental Response, Compensation, and Liability Act Information System Identification Number

The CERCLA Information System identification number for NAS Brunswick/Site 7 is OU7-SITE7-ME8170022018.

C. Lead Agency

The Navy is the lead agency with regulatory oversight from EPA and MEDEP.

D. Site Description

- NAS Brunswick is an active base owned and operated by the Federal government through the Department of the Navy. The primary mission of NAS Brunswick is flight operations related to anti-submarine warfare.

- NAS Brunswick lies at the head of a peninsula with tidal areas nearby. It is located on 3,094 acres of land of which approximately 75 percent is forested areas, grassland, miscellaneous shrubland, marsh, and open water. The remaining 25 percent includes base operations in areas composed of office buildings, barracks, recreational facilities, base housing, hangars, repair shops, and other facilities to support NAS Brunswick, as well as paved areas including flight ramps and runways.

- Topography of NAS Brunswick is characterized by low, undulating hills with deeply incised brooks and bedrock outcrops. Topography at Site 7 is flat with little relief with woods surrounding the open area. There are no wetland areas or streams associated with the site.

- Ground surface elevations range from mean sea level in lowland drainage areas and the Harpswell Cove estuary to over 110 ft mean sea level west and southeast of the southern end of the runways. Site 7 ground surface elevations are approximately 71-77 ft above sea level.

- Current property uses surrounding NAS Brunswick are primarily suburban and rural residential with some commercial and light industry along nearby Routes 1, 24, and 123. An elementary school, college, and a hospital are located within 1 mi of the base boundary. The southern edge of the base borders the estuary of Harpswell Cove.

- The suspected source area at Site 7 is approximately 3,800 ft^2 in area and is located in the northern portion of the base. The land area is zoned industrial, and the area is undeveloped. There are no structures present such as barracks, housing, offices, etc. located at Site 7 (Figure 2-3).

- Site 7 is a generally flat, open clearing surrounded by woods to the west, north, and east.

- Groundwater occurs at Site 7 at a depth of 4-7 ft below ground surface (bgs), and is unconfined. Based on groundwater elevation data collected during several groundwater sampling rounds, groundwater flow direction is generally toward the southeast. Figure 2-4 shows the inferred groundwater flow patterns at Site 7.

A more complete description of Site 7 is provided in Chapter 9 of the Remedial Investigation (E.C. Jordan Co. 1990).

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

A. Land Use and Site Activity History

NAS Brunswick has been an active base since it was commissioned in 1943, except between 1946 and 1951 when the property was used by Bowdoin College and small commercial enterprises. Site 7 was the former location of the old acid caustic pit used from 1952 to 1969 for liquid waste disposal. Wastes reportedly included transformer oil, battery acid, caustics, solvents, and other miscellaneous liquids. The site was also a Defense Reuse and Marketing Office area and used for an equipment laydown area and storage. These historical activities may have contributed to current environmental conditions.

Site 7 consists of the source area and the area where contamination is present. The Site 7 boundary is defined by the institutional control boundary that includes a buffer around the contaminated media.

1. Old Acid Caustic Pit Area

- No record of the precise location of the old acid caustic pit has been found. Field investigations identified an approximate location based upon the data collected from a soil gas survey, ground penetrating radar, terrain conductivity survey, soil borings, test pit excavations, and well installations. The approximate location of the pit is located between TP-702 and TP-704 (Figure 2-3).

- It is believed that the pit was used from 1952 until 1969 to dispose of liquid wastes. The site was also used by the Defense Reuse and Marketing Office facility, and aerial photography shows the area was also used as an outdoor storage and equipment laydown area during this period.

- It is reported that the wastes disposed of in this pit included transformer oil, battery acid, caustics, solvents, and other miscellaneous liquids. During use as an outdoor storage and equipment laydown area, the handling and storage of this material potentially resulted in isolated spills and leaks of fuels and oils.

- The acid caustic pit was in operation and closed prior to the effective date of Resource Conservation and Recovery Act regulations (1976).

- Currently, the site land area is undeveloped.

a. Future Land Use

Future land use at Site 7 is likely to remain undeveloped. NAS Brunswick has no plans to cease its active base status. Groundwater is not used as a potable or domestic source and there are no plans to extract site groundwater for potable and/or domestic use. Cleanup of Site 7 groundwater is estimated to take up to 10 years.

B. History of Federal and State Investigations and Removal and Remedial Actions

- In 1983, an Initial Assessment Study was completed identifying past hazardous waste activities at NAS Brunswick; 10 sites, including the old acid caustic pit site (Site 7), were identified (R.F. Weston 1983).

- In 1984, a Pollution Abatement Confirmation Study recommended further investigation of 7 of the 10 Initial Assessment Study sites, including the old acid caustic pit site (Site 7) (E.C. Jordan Co. 1985).

- In 1987, NAS Brunswick was placed on EPA's National Priorities List.

- In 1987, a Remedial Investigation/Feasibility Study was conducted for the 7 sites recommended for further investigation in the Pollution Abatement Confirmation Study (E.C. Jordan Co. 1990).

- In 1987 and 1990, the Navy conducted environmental field activities at this site as part of a Remedial Investigation (E.C. Jordan Co. 1990) and Supplemental Remedial Investigation (E.C. Jordan Co. 1991) to determine if contamination at the site posed an unacceptable risk to human health or the environment. The investigations focused on locating the approximate area of the former pit and the area downgradient of the disposal pit.

- In 1990, the Navy completed the Draft Final Remedial Investigation Report (E.C. Jordan Co. 1990).

- A Baseline Risk Assessment was completed as part of the Draft Final Remedial Investigation Report for Site 7 to determine potential risk to human health and the environment from exposure to groundwater and soil contaminants (E.C. Jordan Co. 1990; Appendix Q, Volume 4). Results of the Risk Assessment did not indicate a risk to either human or ecological receptors based on current exposure conditions. Additional risk estimates were generated for Site 7 based on the standardized future residential exposure scenario developed by EPA (E.C. Jordan 1992). This guidance was not available at the time the Risk Assessment was conducted for the Draft Final Remedial Investigation. The incremental carcinogenic risks associated with exposure under a future potential residential land use scenario is 3×10^{-5} assuming exposure to the average concentration and 1×10^{-4} assuming exposure to the maximum concentration (E.C. Jordan Co. 1992). While both risk estimates are within EPA's target risk range of from 10^{-6} to 10^{-4}, they exceed the State of Maine's target risk threshold of 1×10^{-5}.

- In 1991, the Navy completed the Draft Final Supplemental Investigation Report (E.C. Jordan Co. 1991), which identified remedial action objectives and alternatives for the sites studied.

- A Feasibility Study was completed for several sites at NAS Brunswick, including Site 7 in 1992 (E.C. Jordan 1992). The Baseline Risk Assessment did not indicate a risk to either human or ecological receptors, therefore, a No Action alternative was recommended in the Feasibility Study. The No Action alternative that included groundwater monitoring was the only alternative developed for Site 7 in the 1992 Feasibility Study. This alternative did not include implementing any actions or controls at Site 7.

- In 1994, the State of Maine adopted the risk-based MEGs for groundwater by reference as part of the Maine Hazardous Waste Rules Relating to Performance Standards for Establishing, Construction, Altering, and Operating Certain Types of Hazardous Waste Units. Based on the MEGs, cadmium and manganese exceeded their respective limits.

- The Navy conducted additional field investigations to identify the nature and extent of the cadmium contamination at Site 7. In July 1997, 2 site wells (MW-NASB-093 [formerly MW-703] and MW-NASB-095 [formerly MW-705]) were sampled as part of background well sampling for the Long-Term Monitoring Program Event 9. The 2 wells were sampled for Target Analyte List inorganic elements by utilizing the low-flow sampling procedure. The results showed that neither MW-NASB-093 or MW-NASB-095 had an exceedance of the Federal MCL or State MEG for Target Analyte List inorganic elements. These wells are located upgradient of MW-NASB-094 and MW-NASB-096.

- In March 1999, the Navy installed 1 new well (MW-NASB-228), east-northeast of the existing well network to assess whether cadmium detected in groundwater may extend downgradient of Site 7 (i.e., more north and east than the existing well network). Monitoring wells MW-NASB-094, MW-NASB-096, and MW-NASB-228 were sampled for Target Analyte List elements. Analytical results indicated that MW-NASB-094 was the only well with elevated concentrations of cadmium (13.6 ppb) above the State MEG (5 ppb). Manganese was detected in three wells (MW-NASB-094, MW-NASB-096, and MW-228) at concentrations of 37.2 ppb, 178 ppb, and 280 ppb, respectively. The MEG for manganese (200 ppb) was only exceeded in well MW-NASB-228.

- In September 1999, based on the findings of the March 1999 sampling round, the Navy installed another new well (MW-NASB-229) to verify the concentrations of cadmium noted in MW-NASB-094. After discussion with the RAB, the location of the well was positioned within 5 ft downgradient of MW-NASB-094. A sample was collected from MW-NASB-229 and submitted for analysis of Target Analyte List elements. Cadmium was detected above both the Federal MCL (5 ppb) and State MEG (5 ppb) in well MW-NASB-229 at a concentration of 18.3 ppb and 16.3 ppb (duplicate sample). Manganese was detected above both the Federal Secondary MCL (50 ppb) and State MEG (200 ppb) in well MW-NASB-229 at concentrations of 1,290 ppb and 1,480 ppb (duplicate sample).

- In 2000 and 2001, supplemental field investigations were performed to search for and remove the source of continuing cadmium concentrations in groundwater above the Federal MCL and State MEG. In December 2000, a 51-hour pump test was conducted using MW-NASB-094 as the pumping well and monitoring 7 other nearby monitoring wells during the test. The cadmium concentrations detected during the pump test were 51 ppb (baseline sample), 52 ppb (approximately 18 hours after starting the pump test), 50 ppb (approximately 36 hours after the pump test began), 48 ppb (approximately 51 hours after the pump test began), and 41 ppb (approximately 24 hours after the pump test ended), all of which were above the Federal MCL and State MEG of 5 ppb. Following the pump test, the Navy completed additional investigations to assess whether an isolated man-made or natural source of cadmium was present in the site soils. Four temporary sampling points were installed to better define the impact of cadmium on the groundwater. Two of these points (TEMP-03 and TEMP-04) reported cadmium levels (17.7 ppb and 32.6 ppb, respectively) higher than drinking water standards of 5 ppb (Federal MCL and State MEG). These data were used to delineate the extent of the excavation. The excavation encountered metal debris and substantial organic material, either of which could be contributing to the cadmium concentrations observed. Two soil samples collected from the removed soil had cadmium detected at concentrations of 110 and 204 ppm as measured by a field x-ray fluorescence detector during the test pit excavations in July 2001. The Navy excavated over 400 yd^3 of material from the site and removed 140 yd^3 for disposal (EA 2002a; Foster Wheeler 2002).

- In November 2001, a groundwater sampling round was completed for all Site 7 wells. The samples were collected using the low-flow sampling procedure and were submitted for analysis of cadmium by EPA Method 6010B. Cadmium was detected in two wells (MW-NASB-099 and MW-NASB-091) at concentrations of 22 ppb and 0.7 ppb,

respectively. The MEG for cadmium (5 ppb) was only exceeded in one well (MW-NASB-099) during this sampling event. The findings of these sampling rounds have been summarized in a letter report issued in March 2002 (EA 2002b).

- Between March and April 2002, Foster Wheeler Environmental Corporation was tasked with conducting a remedial action at Site 7 to remove the stockpiled soils. This remedial action consisted of collecting soil samples to characterize the stockpiled soil, transporting and disposal of contaminated soil, and restoring the site. Two of the five stockpiles (EA-1 and EA-2) were consolidated into one stockpile (identified as FW-1). Composite soil samples were collected from stockpiles FW-1, FW-2, FW-3, and FW-5. The analytical results indicated that stockpiles FW-2 and FW-5 required disposal offsite, and stockpiles FW-1 and FW-3 could remain onsite. Debris such as asphalt and metal were removed from stockpiles FW-1 and FW-3. The debris was transported for offsite disposal. Stockpiles FW-1 and FW-3 were then spread out across the ground surface of Site 7. Stockpiles FW-2 and FW-5 were loaded, transported, and disposed of at ESMI in New Hampshire. Approximately 140 yd^3 of material was disposed of at ESMI (Foster Wheeler 2002).

- The Navy published a Proposed Remedial Action Plan for Site 7 on 29 March 2002, and held a public meeting on 9 April 2002 to present the selected remedial alternatives for Site 7 (EA 2002c).

This ROD presents the selected remedial action discussed in the April 2002 Proposed Remedial Action Plan and addresses the public comments regarding the preferred alternative. Responses to written and oral comments are included in Appendix A of this ROD, the Responsiveness Summary. Responses to regulators' comments on the ROD have all been addressed and accepted by the regulators as indicated in the correspondence also provided in Appendix A.

C. History of Comprehensive Environmental Response, Compensation, and Liability Act Enforcement

In 1990, the Navy entered into a Federal Facility Agreement with EPA and MEDEP that established goals and responsibilities among the Navy and the regulatory agencies and set enforceable cleanup schedules.

III. COMMUNITY PARTICIPATION

A. Public Outreach Effort

Throughout the history of Site 7, community concern and involvement have been high. The Navy has kept the community and other interested parties apprised of site activities through informational press releases and public meetings. Below is a brief chronology of public outreach events:

- In 1987, the Navy established the Administrative Record, which includes all documents relevant to Site 7 investigations. The Administrative Record is available at the Curtis Memorial Library on McKeen Street in Brunswick and at the Navy Public Works office at NAS Brunswick.

- In 1988, a Technical Review Committee (TRC), now known as the RAB, was established to create a forum for the Navy, EPA, MEDEP, and a community representative to discuss site issues. The RAB meets or conducts conference calls on an as-needed basis, usually within every 45-60 days. The RAB meets bi-annually to review the environmental program and receive community input. NOTE: RAB meetings were held quarterly up until 1999. Since then, the RAB meetings have occurred on a bi-annual basis.

- In September 1988, the Navy released a Community Relations Plan (E.C. Jordan 1988) that outlined a program to address community concerns and keep citizens informed of and involved with remedial activities at NAS Brunswick.

- On 5 April 2002, the Navy published a notice announcing a public informational meeting and a brief analysis of the Proposed Plan for Site 7 in *The Times Record*. The Navy made the Plan available at the Curtis Memorial Library in Brunswick.

- On 9 April 2002, a public information meeting was held to present the Proposed Plan for Site 7. This included a poster session followed by a presentation and a question-and-answer period.

- From 1 April to 30 April 2002, a public comment period on the Proposed Plan was held.

- Public comments; EPA, MEDEP, and the Navy's response to comments; and notes of the 9 April 2002 meeting are included in the Responsiveness Summary (Appendix A).

B. Public Outreach Results

The public outreach efforts at Site 7 have been held to inform residents who live near the site. The results of the public outreach efforts are as follows:

- One public meeting, with approximately 10 people in attendance.

- Quarterly RAB update newsletters, reaching up to 150 people, were issued until 1999, and TRC and RAB meetings were held on a quarterly basis from 1988 to 1995 and from 1995 to 1999, respectively. Since 1999, the RAB has been updated on NAS Brunswick progress and activities at different NAS Brunswick sites at least on a bi-annual basis during meetings open to the public.

- Written comment letters on the Proposed Remedial Action Plan (Appendix A).

C. Technical Assistance Grants

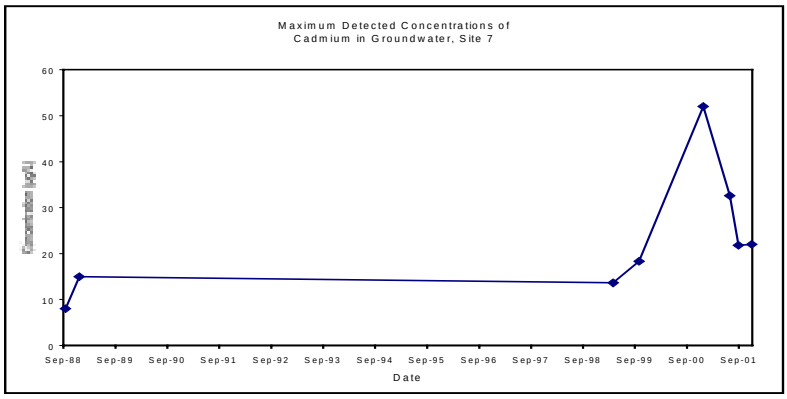
Local residents formed the Brunswick Area Citizens for a Safe Environment to monitor site activities. They have applied for and have been awarded a Technical Assistance Grant from EPA, and have retained a Technical Assistance Grant consultant since 1991 who attends all RAB and technical project meetings.

IV. SCOPE AND ROLE OF RESPONSE ACTION

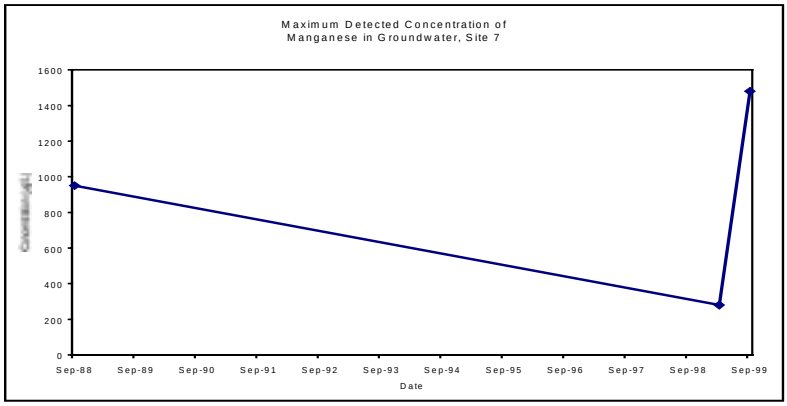
A. Problems Addressed

Based on the investigations performed by the Navy, this ROD addresses the groundwater and soil contamination at Site 7.

1. Groundwater Contamination



Inorganic elements, primarily cadmium and manganese, have been detected in groundwater at Site 7, and may represent a low level threat to groundwater. The concentrations of cadmium noted in the groundwater at Site 7 have been low, with elevated concentrations localized in the vicinity of MW-NASB-094 and MW-NASB-229. Groundwater sampling data indicate that the maximum detected concentration of cadmium was 52 ppb during the pump test in December 2000. Prior to the pump test, maximum cadmium concentrations ranged from 8 to 15 ppb. After the December 2000 pump test, cadmium concentrations have decreased from a high of 32.6 (June 2001) to 22 ppb (November 2001).



During the Remedial Investigation groundwater sampling completed in 1988, manganese was detected at concentrations exceeding the Federal Secondary MCL of 50 ppb in wells MW-NASB-094 (950 ppb) and MW-NASB-096 (51 ppb). In addition, the State

MEG of 200 ppb was exceeded in well MW-NASB-094 during the 1988 sampling event. During additional groundwater sampling activities in 1999, manganese was detected in three wells exceeding both the State MEG (200 ppb) and Federal Secondary MCL (50 ppb) in wells MW-NASB-096 (178 ppb), MW-NASB-228 (280 ppb), and MW-NASB-229 (1,290 ppb – duplicate sample reported manganese at 1,480 ppb).

To date, the Navy has not detected any evidence of movement of COCs from Site 7 above Federal MCLs or State MEGs.

2. Soil Contamination

Contamination detected during the Remedial Investigation and Feasibility Study at Site 7 identified polycyclic aromatic hydrocarbons (PAHs) and pesticide compound (DDT) present in the site soils from a depth of 0-2 ft bgs. PAHs were identified in soil samples collected from the test pits completed in 1988 and reported concentrations ranging from 350 to 20,000 ppb in the soils to a depth of 2 ft bgs. The specific test pit locations that reported concentrations of PAHs are: TP-709, TP-710, TP-711, TP-713, TP-714, TP-715, TP-716, TP-717, and TP-719. Pesticide compound DDT was reported in the top 2 ft of soil at Site 7 in test pits TP-709, TP-710, TP-711, TP-712, TP-714, TP-716, TP-717, TP-718, and TP-719 with concentrations ranging from 25 to 420 ppb. The observed contamination is consistent with the historical use of this site as an Acid Disposal Pit and Defense Reuse and Marketing Office facility. The surface and shallow soil distribution of PAHs is consistent with the former use of this area as an equipment laydown area/recycling area. The presence of pesticides in the shallow soils is related to the use of this pesticide and/or handling practices of the former DMRO facility.

3. Summary

The groundwater at Site 7 is not used as a source of potable water, is not of sufficient capacity for a public supply, and the base is served by a public water supply managed by the Town of Brunswick that is located off the base. Because the threat to human health is not immediate, there are no active sources of contamination, and there is no evidence of offsite contaminant migration above the Federal MCLs or State MEGs, removal and/or active remediation is not considered practicable for this site. Natural attenuation will reduce contaminant concentrations in the site groundwater over time, and the establishment of institutional controls will protect human health by preventing the use of and contact with impacted media. The Navy will develop a Long-Term Monitoring Program to gauge the progress of natural attenuation and detect any contaminant migration that may occur. In summary, the principal and low level threats addressed within this ROD are provided below:

Contaminant	Media	Contaminant	Action
Principal Threats			
None at Site 7	Not applicable	Not applicable	Not applicable
Low Level Threats			
SVOCs (PAHs and pesticide compounds)	Soil (0-2 ft bgs)	PAHs, DDT, DDD, and DDE	Institutional controls for soil
Inorganic	Groundwater	Cadmium and manganese	Natural attenuation with long-term monitoring and institutional controls

B. Planned Sequence of Action

The following remedial actions are planned for Site 7.

1. Groundwater and Soil Contamination

The planned sequence of action with regard to Site 7 groundwater and soil contamination includes the following:

- As part of the Remedial Action Plan for this site, the Navy will implement institutional controls to prevent the use of and contact with site groundwater and soil at Site 7. These institutional controls will consist of groundwater and soil use restrictions per the current NAS Brunswick Operations Instructions in effect. The Operations Instructions are used to identify and screen environmental areas for inappropriate construction or development activities. The Navy will generate and provide a draft of the instrument containing these groundwater and soil use restrictions to the RAB for review and comment, and to EPA and MEDEP for review, comment, and finalization pursuant to the Federal Facility Agreement within 15 months after the signature of this ROD. When finalized, the groundwater and soil use restrictions will be incorporated into the Operations Instructions and placed in the Administrative Record for Site 7. The Operations Instructions will not be modified in any way that affects these use restrictions or the Site 7 remedy. The institutional controls will be inspected, noted, verified, and reported during the Long-Term Monitoring Program to be implemented at Site 7 in accordance with the Federal Facility Agreement. The monitoring and reporting of institutional controls will be described in the Site 7 Long-Term Monitoring Plan which will be prepared and finalized pursuant to the Federal Facility Agreement as part of the Remedial Action Plan for this site within 15 months after the signature of this ROD.

  The radius of the proposed institutional control is 225 ft that will include the locations of the Remedial Investigation test pits where PAHs and DDT were detected in the site soils (0-2 ft bgs). If, in the future, the Navy decides to change the site use to a residential type of use, it will submit a memo to EPA, MEDEP, and the RAB for review and comment detailing the soil removal actions that it will take to remove the soil containing PAHs and DDT in accordance with applicable laws and regulations and with the Federal Facility Agreement. Once the soil has been removed from the site, the Navy will revise or modify the Site 7 ROD in accordance with applicable laws and regulations and will ensure that the institutional control instrument according to its terms will provide for the removal of the institutional controls for soils at the site.

- Should the Navy transfer or lease any real property affected by Site 7, whether or not as a result of base closure, the Navy will notify EPA and MEDEP, in accordance with the Federal Facility Agreement, and the RAB at least 60 days prior to the transfer or lease. In consultation with EPA and MEDEP, the Navy will include appropriate provisions (i.e., restrictive covenants or other use restrictions such as institutional controls) in all

documents that evidence the transfer or lease to prevent the use of and contact with site groundwater and soil. If the property is transferred, or the lease allows capital improvements, a technical evaluation of the effectiveness and appropriateness of the remedy will be undertaken considering long-term monitoring results to date, the proposed land use, and the fact that the Navy may no longer actively own or operate the property.

- As part of the Remedial Action Plan for this site, the Navy will institute a Long-Term Monitoring Program that will be adjusted based on sample results. A monitoring plan will be developed and forwarded to the RAB for consultation as well as to EPA and MEDEP for review, comment, and finalization in accordance with the Federal Facility Agreement. If the Navy revises the Long-Term Monitoring Program, it will forward the revisions to the RAB for consultation as well as to EPA and MEDEP for review, comment, and finalization in accordance with the Federal Facility Agreement, prior to incorporating the revisions into the plan. The goals of the Long-Term Monitoring Program are as follows:

  — Assessing variations in the concentrations of cadmium and manganese in groundwater to determine the effectiveness of natural attenuation

  — Assessing whether contamination is migrating offsite

  — Assessing variations in groundwater flow patterns

  — Monitoring structural integrity of the groundwater monitoring wells.

In addition, pursuant to the Federal Facility Agreement and CERCLA, a review will be completed at least once every 5 years to evaluate the progress and effectiveness of the remedial action and to ensure that human health and the environment continue to be protected. The five-year review process shall remain effective until institutional controls are no longer required at the site.

V. SUMMARY OF SITE CHARACTERISTICS

A. Site Overview

- The suspected source area at Site 7 is approximately 3,800 ft^2 in area and is located in the northern portion of NAS Brunswick. It consists of an undeveloped, level open field surrounded by woods on three sides of the site.

- Hydrogeology at Site 7 is characterized by shallow groundwater in the overburden soil, and the water table varies in depth between 4 and 7 ft bgs.

- Overburden soil at Site 7 is a stratified formation consisting of a fine to medium sand layer, underlain by a prominent clay unit. The depth to bedrock at the site ranges from 11.7 to 20.6 ft bgs (inferred by refusal depths).

- Groundwater flow at the site is to the southeast.
- Historical data indicate Site 7 was the location of a former acid and caustic disposal pit where hazardous material disposal activities reportedly occurred.
- There are no wetland areas, ponds, or streams located at Site 7.
- Currently, there are no buildings or other structures located at Site 7.
- The groundwater at Site 7 is not used as a source of potable water, is not of sufficient capacity for a public supply, and the base is served by a public water supply managed by the Town of Brunswick that is located off the base.
- Older children aged 7-12 comprise the population potentially at highest risk from Site 7 contamination as they would be the most likely group to be playing in soil and would have less supervision than younger children. Risk associated with adult residents and workers is minimal.
- Wildlife populations at or near Site 7 include birds, reptiles, amphibians, and small mammals. There are no threatened or endangered species living at or near Site 7.

A more complete description of Site 7 is provided in Chapter 9 of the Remedial Investigation report (E.C. Jordan Co. 1990).

B. Type of Contamination and Affected Media

1. Groundwater Contamination

The groundwater contamination at Site 7 is considered to represent a low level threat based on the following:

- The primary COCs in groundwater are cadmium and manganese, which have been detected above the Federal MCLs and State MEGs. Other inorganic elements and compounds detected in groundwater include iron, potassium, sodium, and bis(2-ethylhexyl)phthalate.
- No evidence of offsite migration of COCs above Federal MCLs or State MEGs has been detected.
- Cadmium contamination has been detected above Federal MCLs and State MEGs, but at levels that would present only a low level risk in the event of exposure.
- Manganese has been detected at elevated concentrations above the State MEG and Federal Secondary MCL, but at levels that would present only a low level risk in the event of exposure.

- Site 7 groundwater is neither a current drinking water source nor a significant potential future drinking water source.

2. Soil Contamination

The soil contamination at Site 7 is considered to represent a low level threat based on the following:

- The primary COCs in soil are PAH compounds and the pesticide DDT, which have been detected in the shallow soils and appeared confined to a depth no greater than 2 ft bgs.

- There is no exposure to the soils under the current site use.

- PAHs and DDT are relatively stable in the soils since they readily adhere and sorb to the soils that are followed by biodegradation. They also have low solubility in water that limits transport to groundwater via leaching.

An overview of the significant findings of the investigations at Site 7, and a description of the types of contamination and the affected media, are provided in Table 2-1.

C. Contamination Sources and Sampling Strategies

Media that have been sampled during field investigations include surface soil, subsurface soil, and groundwater. To date, a Remedial Investigation, Supplemental Remedial Investigation, Soil and Groundwater Investigation, a limited soil removal action, and several groundwater sampling events have been completed. These investigations identified the following potential sources of contamination:

Contaminant Type	Media Affected	Suspected Source
Inorganics	Groundwater	Acid caustic pit, or natural site conditions
PAHs	Surface and shallow soils	Motor vehicle exhaust, burning materials
Pesticides	Surface and shallow soils	Historical base usage

1. Fate of Chemical Contaminants

The fate of chemical COCs at Site 7 is as follows.

a. Soil

- PAHs and the pesticide DDT were identified in the surface and shallow soils of the site.

- PAHs and pesticides in soil are relatively stable due to high sorption properties and have low solubility in water. Therefore, they pose limited threat to groundwater and offsite receptors.

- Based on the monitoring results to date, there is no evidence of offsite contaminant migration from Site 7 in groundwater or soil.

b. Groundwater

- Inorganics have been detected in groundwater, primarily the inorganic elements cadmium and manganese. Other inorganic elements detected in the groundwater at Site 7 include aluminum, calcium, iron, lead, potassium, sodium, and zinc; however, these elements were consistent with background levels and did not exceed any regulatory levels (E.C. Jordan 1990, 1992).

- Groundwater sampling data indicate that the maximum detected concentration of cadmium was 52 ppb during the pump test in December 2000. Prior to the pump test, maximum cadmium concentrations ranged from 8 to 15 ppb. After the December 2000 pump test, cadmium concentrations decreased from a high of 32.6 (June 2001) to 22 ppb (November 2001).

- Monitoring data indicate manganese concentrations detected in 3 monitoring wells at Site 7 have exceeded the State MEG of 200 ppb and the Federal Secondary MCL of 50 ppb.

- Groundwater at Site 7 is neither a drinking water source nor a significant potential future drinking water source.

- To date, no evidence of movement of COCs from Site 7 above Federal MCLs or State MEGs has been detected.

D. The Conceptual Model

1. Site Description

The suspected source area at Site 7 is approximately 3,800 ft^2 in size. The site is an open field that is generally flat across its extent and is surrounded by woods on three sides of the site. There are no wetland areas, streams, or ponds located on the site. There are no structures such as buildings, paved roadways, or parking areas located on the site. No areas of archaeological or historical importance are known to be present (E.C. Jordan 1990).

2. Geology and Hydrogeology

The Site 7 area is underlain by fine to medium sand at depths ranging in thickness up to 20 ft. A transitional unit, common elsewhere at NAS Brunswick, was not identified underlying the sand at Site 7. Underlying the sand is a clay unit. The depth to bedrock at the site has been inferred based upon refusal depth to range from 11.7 to 20.6 ft bgs.

Groundwater occurs at the site at a depth ranging from 4 to 7 ft bgs, and is unconfined. Based on groundwater elevation data gathered during the several groundwater sampling rounds, the groundwater flow direction is generally toward the southeast. Figure 2-4 shows the inferred groundwater contours at Site 7.

3. Impacted Media and Migration Route

a. Soil

Surface soil at Site 7 does not pose an unacceptable risk to human health or the environment under current site uses (i.e., undeveloped and undisturbed). During the Remedial Investigation/Feasibility Study program, PAH and pesticide contamination was detected in the surface and shallow soils, but was confined to this interval. The results are consistent with the findings of the 1985 Pollution Abatement Confirmation Study. The observed distribution of contamination in surface and shallow soils is confined vertically to the 0- to 2-ft interval. Handling and storage of materials potentially gave rise to isolated spills and leaks of fuels and oils (E.C. Jordan Co. 1991).

The surface and shallow soil distribution of PAHs (associated with the weathering of petroleum fuels and oils; PAHs are typically tightly bound to soils in the presence of organic material) is consistent with the use of this site as an equipment laydown area/recycling yard. Pesticides detected in the shallow Site 7 soils are related to the use of DDT and/or DDT handling practices at the Defense Reuse and Marketing Office facility at Site 7 (E.C. Jordan Co. 1991).

The contamination at Site 7 includes low levels of PAHs (350-20,000 ppb) and DDT (25-420 ppb) in the surface and shallow soils. PAHs are relatively stable in the soil environment due to the high sorption properties. The ultimate fate of PAHs in soils at Site 7 is sorption to the soils, followed by slow biodegradation, therefore, PAH mobility is limited in the soil environment. PAHs also typically have low solubility in water, further limiting potential transport to groundwater via leaching (E.C. Jordan Co. 1990).

DDT also has a strong propensity to adhere to soils, and sorption is the dominant fate of DDT in soils. Therefore, like PAHs, DDT will sorb to the soils and ultimately biodegrade. Two major processes direct the degradation of DDT. First, aerobic degradation results in the formation of DDE; and second, anaerobic degradation typically results in the formation of DDD. DDT and its metabolites have lower water solubility, which acts to minimize migration in the environment (E.C. Jordan Co. 1990).

A Risk Assessment was conducted in 1990 for human health and ecological receptors. The 1990 Risk Assessment found that no human health risks are associated with exposure to contaminants detected in the surface soils at Site 7. The 1990 Baseline Risk Assessment evaluated risks associated with repetitive direct contact and incidental ingestion exposure incurred by young children who may trespass and/or play in this area. No environmental risks are associated with contaminants detected in the surface soils at Site 7. Since there are no streams or wetland areas associated with Site 7, environmental risks were estimated for terrestrial organisms. Exposure to

PAHs and DDT in the soils was evaluated using a food web analysis. The modeled exposure to terrestrial receptors was below levels considered to present an environmental risk (E.C. Jordan Co. 1990). Additional risk estimates were generated for Site 7 based on the standardized future residential exposure scenario developed by EPA (E.C. Jordan 1992). This guidance was not available at the time the Risk Assessment was conducted for the Draft Final Remedial Investigation Report. The incremental carcinogenic risks associated with exposure under a future potential residential land use scenario is 3×10^{-5} assuming exposure to the average concentration and 1×10^{-4} assuming exposure to the maximum concentration (E.C. Jordan Co. 1992). While both risk estimates are within EPA's target risk range of from 10^{-6} to 10^{-4}, they exceed the State of Maine's target risk threshold of 1×10^{-5}.

b. Groundwater and Other Media

Groundwater contamination at Site 7 consists only of elevated cadmium concentrations in two monitoring wells and manganese in three wells. Plume migration of contaminated groundwater does not have the potential to impact other media, including stream sediment and surface water. Likely migration routes for human exposure to these media are through contact or ingestion. The quantity of impacted groundwater at Site 7 is limited to the shallow aquifer.

The manganese detected at Site 7 could potentially be the result of past site activities, or anthropogenic. However, manganese is found in groundwater throughout Maine, including NAS Brunswick, since it is a naturally occurring mineral and, therefore, its presence could be related to natural conditions at the site. The current remedy addresses both cadmium and manganese and, therefore, the presence of manganese does not alter the selected remedy. If the Navy can demonstrate that the level of manganese at Site 7 is similar to that of naturally occurring background range at NAS Brunswick, then the Navy will propose removing it as a COC for this site.

E. Principal and Low Level Threat Wastes

Principal threat wastes are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. The manner in which principal threats are addressed generally will determine whether the statutory preference for treatment as a principal element is satisfied. Wastes generally considered to be principal threats are liquid, mobile, and/or highly-toxic source material.

Low level threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. Wastes that are generally considered to be low level threat wastes include non-mobile contaminated source material of low to moderate toxicity, surface soil containing COCs that are relatively immobile in air or groundwater, low leachability contaminants, or low toxicity source material.

Principal and low level threat wastes at Site 7 are summarized in the following table:

Source Media	Affected Media	Contaminant(s)	Reason	Concentration	Receptors
Principal Threats					
None at Site 7	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Low Level Threats					
	Groundwater	Cadmium	Limited mobility, monitoring, institutional controls	0-52 ppb	Not a drinking water source
	Groundwater	Manganese	Limited mobility, monitoring, institutional controls	0-1,480 ppb	Not a drinking water source
Shallow soil	Soil	PAHs	Limited mobility, institutional controls	360-20,220 ppb	Children ages 7-12 incidental ingestion and contact
Shallow soil	Soil	Pesticide (DDT)	Limited mobility, institutional controls	25-420 ppb	Children ages 7-12 incidental ingestion and contact
NOTE: The source at Site 7 was not positively identified, but an approximate area of the old acid/caustic pit was identified during the 1990 Remedial Investigation (Figure 2-3).					

F. Site-Specific Factors

1. Site 7

Site 7 is not presently used for any specific purposes; there are no plans to develop the site area.

VI. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

Current and potential future site and resource uses are summarized in the following table:

Resource	Current Onsite Use	Current Adjacent Use	Potential Use	Potential Use Basis	Potential Use Timeframe
Land	None	Old Navy Fuel Farm and base housing	Residential and recreational	NAS Brunswick plans to remain active; if it should close, Site 7 could become a residential area	Unknown
Shallow Groundwater	None	None	Minimal potable use potential	Low yielding aquifer	Unknown
Deep Groundwater	None	None	Minimal potable use potential	Low yielding aquifer	Unknown

Currently, NAS Brunswick is operated by the Department of Defense. Should the base close, the reuse of Site 7 will be assessed through the base closure process.

VII. SUMMARY OF SITE RISKS

A Baseline Risk Assessment was completed as part of the Remedial Investigation at Site 7 to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with Site 7, assuming no remedial action was taken. It provides the basis for taking action and identifies the contaminants and exposure pathways needed to be addressed by the remedial action. The Human Health Risk Assessment followed a 4-step process:

1. **Contaminant Identification**—Identified those hazardous substances which, given the specifics of the site, were of significant concern

2. **Exposure Assessment**—Identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure

3. **Toxicity Assessment**—Considered the types and magnitude of adverse health effects associated with exposure to hazardous substances

4. **Risk Characterization**—Integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the site, including carcinogenic and non-carcinogenic risks.

A summary of those aspects of the Human Health Risk Assessment that support the need for remedial action is discussed below, followed by a summary of the Ecological Risk Assessment.

A. Human Health Risk Assessment

The Human Health Risk Assessment was completed for Site 7 surface and subsurface soils and groundwater. The Human Health Risk Assessment was completed in 1990 (E.C. Jordan Co. 1990, Appendix Q) using the established methods at that time.

Sixteen COCs were identified in the Remedial Investigation and were selected for evaluation in the Human Health Risk Assessment. COCs were selected to represent potential site-related hazards based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment. Tables Q-5, Q-12, Q-13, and Q-14 in Appendix Q of the Draft Final Remedial Investigation Report (E.C. Jordan Co. 1990) show a summary of all COCs, exposure point concentrations used to evaluate the reasonable maximum exposure scenario, and estimates of average or central tendency exposure concentrations.

Table 2-2 presents each COC and its exposure point concentration for groundwater. This table includes the average and maximum concentrations detected for each COC, the frequency of detection, the exposure point concentration, and how the exposure point concentration was derived. The maximum concentration for each COC was used to determine the worst-case scenario risk estimate at Site 7.

Potential human health effects associated with exposure to the COCs were estimated quantitatively or qualitatively through the development of several hypothetical exposure pathways. These pathways were developed to reflect the potential for exposure to hazardous substances based on the present uses, potential future uses, and location of the site.

Conservative assumptions for the Risk Assessment included the following:

- Site 7 is presently undeveloped land with no structures present at the site.
- Groundwater at Site 7 is not currently used as a source of drinking water.
- It is predicted that land and groundwater use will remain the same, as there are no plans to close the base in the foreseeable future.
- Risks were also calculated to determine residential exposure based on incidental ingestion of soil occurring 350 days per year for 30 years. This scenario includes potential risk for both current and reasonable future land use.

The following paragraphs contain a brief summary of the exposure pathways that were found to present a significant risk. A more thorough description of all exposure pathways evaluated in the Risk Assessment, including estimates for an average exposure scenario, can be found in Appendix Q of the Remedial Investigation (E.C. Jordan Co. 1990).

Table 2-3 provides carcinogenic risk information relevant to the COCs in both soil and groundwater. Cancer slope factor adjustments were used for chemicals with less than 50 percent absorption via the ingestion route. However, adjustments were not necessary for the chemicals evaluated at this site. As a result, the same values presented in Table 2-3 were also used as dermal carcinogenic slope factors. Inhalation and external radiation routes of exposure were not applicable at Site 7.

Table 2-4 provides risk estimates for the significant routes of exposure at Site 7. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of an exposure to groundwater. Risk estimates for surface water were not included since they do not exist at this site.

Excess lifetime cancer risks were determined for each exposure pathway by multiplying a daily intake level with the chemical-specific cancer potency factor. Cancer potency factors have been developed by EPA from epidemiological or animal studies to reflect a conservative "upper bound" of the risk posed by potentially carcinogenic compounds; that is, true risk is unlikely to be greater than the risk predicted. The resulting risk estimates are expressed in scientific notation as a probability (e.g., 1×10^{-6} for 1/1,000,000) and indicate (using this example) that an average individual is not likely to have greater than a one in a million chance of developing cancer over 70 years as a result of site-related exposure (as defined) to the compound at the

stated concentration. All risks estimated represent an "excess lifetime cancer risk," or the additional cancer risk on top of that which individuals face from other causes such as cigarette smoke or exposure to ultraviolet radiation from the sun. The chance of an individual developing cancer from all other (non-site-related) causes has been estimated to be as high as 1 in 3. EPA's generally acceptable risk range for site-related exposure is from 10^{-4} to 10^{-6}. MEDEP's incremental carcinogenic guideline is 1×10^{-5}. Current EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances.

In assessing the potential for adverse effects other than cancer, a hazard quotient is calculated by dividing the daily intake level by the reference dose or other suitable benchmark. Reference doses have been developed by EPA, and they represent a level to which an individual may be exposed that is not expected to result in any deleterious effect. Reference doses are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. A hazard quotient indicates that a receptor's dose of a single contaminant is less than the reference dose, and that toxic non-carcinogenic effects from that chemical are unlikely. The hazard index is generated by adding the hazard quotients for all COCs that affect the same target organ (e.g., liver) within or across all media to which a given individual may reasonably be exposed. A hazard index <1 indicates that toxic non-carcinogenic effects are unlikely.

1. Groundwater

Table 2-5 provides non-carcinogenic risk information relevant to the COCs in groundwater. Dermal contact and inhalation were not considered applicable routes of exposure at Site 7 since the groundwater at Site 7 is not used as a private or public water supply.

Cadmium was detected in monitoring wells at Site 7 in excess of its Federal MCL and State MEG of 5 ppb, respectively. Manganese did not have a MEG at the time of the Remedial Investigation, but did have a Secondary Federal MCL of 50 ppb, and was not included in the Baseline Risk Assessment. A quantitative exposure assessment for the ingestion of groundwater was not developed since exposure to cadmium in groundwater is unlikely because there are no downgradient receptors and there is no domestic use of the groundwater from this site currently or planned for the future. The Navy has no plans to develop the site groundwater for domestic use in the future.

2. Soil

No human health risks are associated with exposure to contaminants detected in the surface soils at Site 7. The Baseline Risk Assessment evaluated risks associated with repetitive direct contact and incidental ingestion exposure incurred by young children who may trespass and/or play in this area (E.C. Jordan 1990). The incremental carcinogenic risks for this exposure scenario ranged from 1×10^{-6} to 6×10^{-6} (the upper risk estimate is based on long-term exposure to the maximum detected contaminant level in soil) (E.C. Jordan 1990). The noncarcinogenic Hazard Indices for this exposure scenario were all below 1.0 (E.C. Jordan 1990).

Additional risk estimates were generated for Site 7 based on the standardized future residential exposure scenario developed by EPA (U.S. EPA 1991a). This guidance was not available at the time the Risk Assessment was conducted for the Draft Final Remedial Investigation Report. The incremental carcinogenic risks associated with exposure under a future potential residential land use scenario is 3×10^{-5} assuming exposure to the average concentration and 1×10^{-4} assuming exposure to the maximum concentration (E.C. Jordan Co. 1992). While both risk estimates are within EPA's target risk range of from 10^{-6} to 10^{-4}, they exceed the State of Maine's target risk threshold of 1×10^{-5}.

a. Risk Assessment Uncertainties

Risk assessment uncertainties identified in the Human Health Risk Assessment may include the following factors:

- Use of established standards, criteria, and carcinogen exposure values for calculation of site risk
- Extrapolating potential adverse human health effects from animal studies
- Extrapolating effects observed at high dose to low dose effects
- Modeling dose response effects
- The potential future residential use of this site may pose an unacceptable risk to human health if the soils are not removed from the site.

To minimize the impact of these uncertainties on the outcome of the Risk Assessment, realistic lower and upper bounds of risk are provided for each exposure scenario. These numbers are not indices of absolute risk, but rather a range that should include the actual risk.

B. Ecological Risks

No environmental risks are associated with the contaminants detected in the surface soils or groundwater at Site 7. Because there are no streams or wetland areas associated with this site, environmental risks were estimated for terrestrial organisms. Exposure to PAHs and DDT in the soils was evaluated using a food web analysis. The modeled exposure to terrestrial receptors was below levels considered to present an environmental risk. Risks to terrestrial organisms with regards to contact or ingestion with soil are presumed to be minimal or insignificant. Groundwater contamination poses no threat to wildlife, as it is inaccessible.

C. Basis for Response Action

The response action for Site 7 is based on the following:

- Residential use of the site in the future may present an unacceptable risk to human health.
- The Baseline Human Health Risk Assessment revealed that children who may trespass or play in this area are not potentially at risk if exposed to COCs via repetitive dermal contact or accidental ingestion (E.C. Jordan 1990). However, additional risk estimates (E.C. Jordan 1992) identified risks that exceed the State of Maine risk threshold.
- If not addressed by implementing the selected remedy in this ROD, these factors may present an unacceptable risk to human health or the environment.

VIII. REMEDIATION OBJECTIVES

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA established several other statutory requirements and preferences, including:

- A requirement that the Navy's remedial action, when complete, must comply with all federal and more stringent state environmental standards, requirements, criteria, or limitations, unless a waiver is invoked.
- A requirement that the Navy select a remedial action that is cost effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.
- A preference for remedies in which treatment that permanently and significantly reduces the volume, toxicity, or mobility of the hazardous substance as a principal element over remedies not involving such treatment.

Response alternatives were developed to be consistent with these congressional mandates.

Based on preliminary information relating to types of contaminants, environmental media of concern, and potential exposure pathways, remedial action objectives were developed to aid in the development and screening of alternatives. These remedial action objectives were developed to mitigate existing and potential future threats to public health and the environment. The remedial action objectives for Site 7 are to:

- Reduce contaminant concentrations in Site 7 groundwater consistently below Federal MCL and State MEG target cleanup levels
- Prevent human and ecological exposure (i.e., ingestion, dermal contact) to Site 7 groundwater and soil.

- Prevent any migration of the Site 7 groundwater plume offsite.

The basis and rationale for these remedial objectives are the most practical for Site 7 based on current and reasonably anticipated exposure routes. With regard to the groundwater, Site 7 is located on an active military base whose water is supplied by the Brunswick Water District; groundwater from the site is not a current or significant potential future source of water for drinking or residential use as the shallow aquifer there provides limited groundwater yield and is considered an unlikely source for potential potable use.

The remedial action objectives address risks identified in the Risk Assessment by reducing or eliminating exposure to site contaminants.

IX. DESCRIPTION OF ALTERNATIVES

CERCLA and the National Contingency Plan set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements, a range of alternatives was developed for Site 7. With respect to groundwater response action, the Remedial Investigation/ Feasibility Study developed a No Action alternative based on the results of the Baseline Risk Assessment completed in 1990, which indicated that there where no risks to either humans or ecological receptors at Site 7.

As discussed in Chapter 7 of the Feasibility Study, this alternative did not involve implementing any actions or controls, but did include monitoring. Based on the EPA guidance in effect at the time the Feasibility Study was presented, the requirements under CERCLA Section 121 cleanup standards for selection of a Superfund remedy, including the requirements to meet applicable or relevant and appropriate requirements (ARARs), were not triggered. Therefore, since CERCLA Section 121 (a) required only that those remedial actions that are "determined to be necessary… under Section 104 or…106…be selected in accordance with Section 121" (E.C. Jordan Co. 1990), chemical-specific ARARs would not be triggered.

Since the earlier remedial investigations at Site 7 and the Risk Assessment, the State of Maine adopted the risk-based MEGs for groundwater. In response, the Navy has conducted several investigations to best define the nature and extent of the contamination at Site 7. After identifying an area, a removal action was conducted in an attempt to close out the site with no further action; however, cadmium and manganese concentrations still remained above the Federal MCL and State MEG.

This section presents a description of the two remedial alternatives considered for Site 7:

- Alternative 1—No Action
- Alternative 2—Institutional Controls with Groundwater Monitoring.

A. Alternative 1—No Action

Under the No Action alternative, no remedial action would be implemented. The No Action alternative is required by CERCLA to serve as a baseline for comparison. The No Action alternative does not meet the remedial goals for Site 7 because it would not control or prevent contact with affected groundwater, i.e., it would not require any remedial activity, long-term monitoring, or institutional controls. Hence, the No Action alternative is not protective of human health and the environment. However, five-year reviews will be conducted.

- Estimated Time for Design and Construction: 0
- Estimated Time for Operation: 0
- Estimated Capital Cost: $0
- Estimated Annual Operation and Maintenance (Present-Worth): $18,000*
- Estimated Total Cost (20-Year Present-Worth): $18,000
  *Includes cost of five-year reviews for 20 years.

B. Alternative 2—Institutional Controls with Groundwater Monitoring

1. Groundwater and Soil Contamination

To address groundwater contamination at Site 7, this alternative would include the following:

- Allow the toxicity and volume of the contamination to be reduced through the natural attenuation processes.

- As part of the Remedial Action Plan for this site, the Navy will implement institutional controls to prevent the use of and contact with site groundwater and soil at Site 7. These institutional controls will consist of groundwater and soil use restrictions per the current NAS Brunswick Operations Instructions in effect. The Operations Instructions are used to identify and screen environmental areas for inappropriate construction or development activities. The Navy will generate and provide a draft of the instrument containing these groundwater and soil use restrictions to the RAB for review and comment, and to EPA and MEDEP for review, comment, and finalization pursuant to the Federal Facility Agreement within 15 months after the signature of this ROD. When finalized, the groundwater and soil use restrictions will be incorporated into the Operations Instructions and placed in the Administrative Record for Site 7. The Operations Instructions will not be modified in any way that affects these use restrictions or the Site 7 remedy. The institutional controls will be inspected, noted, verified, and reported during the Long-Term Monitoring Program to be implemented at Site 7 in accordance with the Federal Facility Agreement. The monitoring and reporting of institutional controls will be described in the Site 7 Long-Term Monitoring Plan which will be prepared and finalized pursuant to the Federal Facility Agreement as part of the Remedial Action Plan for this site within 15 months after the signature of this ROD.

The radius of the proposed institutional control is 225 ft that will include the locations of the Remedial Investigation test pits where PAHs and DDT were detected in the site soils (0-2 ft bgs). If, in the future, the Navy decides to change the site use to a residential type of use, it will submit a memo to EPA, MEDEP, and the RAB for review and comment detailing the soil removal actions that it will take to remove the soil containing PAHs and DDT in accordance with applicable laws and regulations and with the Federal Facility Agreement. Once the soil has been removed from the site, the Navy will revise or modify the Site 7 ROD in accordance with applicable laws and regulations and will ensure that the institutional control instrument according to its terms will provide for the removal of the institutional controls for soils at the site.

- Should the Navy transfer or lease any real property affected by Site 7, whether or not as a result of base closure, the Navy will notify EPA and MEDEP in accordance with the Federal Facility Agreement, and the RAB at least 60 days prior to the transfer or lease. In consultation with EPA and MEDEP, the Navy will include appropriate provisions (i.e., restrictive covenants or other use restrictions such as institutional controls) in all documents that evidence the transfer or lease to prevent the use of and contact with site groundwater and soil. If the property is transferred, or the lease allows capital improvements, a technical evaluation of the effectiveness and appropriateness of the remedy will be undertaken considering long-term monitoring results to date, the proposed land use, and the fact that the Navy may no longer actively own or operate the property.

- As part of the Remedial Action Plan for this site, the Navy will institute a Long-Term Monitoring Program, which will be adjusted based on sample results. A monitoring plan will be developed and forwarded to the RAB for consultation as well as to EPA and MEDEP for review, comment, and finalization in accordance with the Federal Facility Agreement. If the Navy revises the Long-Term Monitoring Program, it will forward the revisions to the RAB for consultation as well as to EPA and MEDEP for review, comment, and finalization in accordance with the Federal Facility Agreement, prior to incorporating the revisions into the plan. The goals of the Long-Term Monitoring Program are as follows:

  — Assessing variations in the concentrations of cadmium and manganese in groundwater to determine the effectiveness of natural attenuation

  — Assessing whether contamination is migrating offsite

  — Assessing variations in groundwater flow patterns

  — Monitoring structural integrity of the groundwater monitoring wells.

2. Applicable or Relevant and Appropriate Requirements

Appendix B provides the specific ARARs.

a. Federal Relevant and Appropriate Requirements

Chemical-Specific:

- Safe Drinking Water Act – MCLs (40 CFR 141.11–141.16) (U.S. EPA 1999)
- Safe Drinking Water Act – MCL Goals (40 CFR 141.50 –141.51).

Action-Specific:

- Resource Conservation and Recovery Act Identification and Listing of Hazardous Waste Toxicity Characteristics (40 CFR 261.24).

b. State Relevant and Appropriate Requirements

Chemical-Specific:

- Maine Department of Human Services Rules Relating to Drinking Water (10-144E, Chapters 231-233)

- Maine Department of Human Services (Rules Relating to Testing of Private Water Systems for Potentially Hazardous Contaminants [10-144A Code of Maine Regulations Chapter 233, Appendix C])

- Maine Hazardous Waste Rules relating to Performance Standards for Establishing, Constructing, Altering, and Operating Certain Types of Hazardous Waste Units (06-096 CMR 854)

- 38 M.R.S.A. 465-C, Maine Classification of Waters Program – Groundwater and Classification of Maine Waters (§464 (4)(A)(1).

Action-Specific:

- Maine Surface Water Toxics Control Program (38 MRSA Sections 420, 464, 06-096 CMR-530)

- Maine Hazardous Waste Rules Relating to Performance Standards for Establishing, Constructing, Altering, and Operating Certain Types of Hazardous Waste Units (06-096 CMR 854)

- Maine Solid Waste Management Rules – General Provisions (06-096 CMR 400)

- Maine Solid Waste Management Rules – Water Quality Monitoring, Leachate Monitoring, and Waste Characterization (06-096 CMR 405).

To Be Considered:

- EPA Risk Reference Doses (U.S. EPA 1999)
- EPA Human Health Assessment Group Cancer Slope Factors (U.S. EPA 1999)
- Guidance Manual for Conducting Human Health Risk Assessment at Hazardous Substance Sites (June 1994)
- Draft Interim MEGs (Bureau of Health, Maine Department of Human Services, 3 January 2000)
- MEDEP, Draft Implementation of Remedial Action Guidelines (May 1997).

3. Five-Year Review

In addition, a review would be completed at least once every 5 years, pursuant to the Federal Facility Agreement, to evaluate the progress and effectiveness of the remedial action and to ensure that human health and the environment continue to be protected. The five-year review process shall remain effective until institutional controls are no longer required at the site.

- Estimated Time for Design and Construction: 0
- Estimated Time for Operation Up to 10 years
- Estimated Capital Cost: $1,150
- Estimated Annual Operation and Maintenance (10-Year Present-Worth): $366,520
- Estimated Total Cost (10-Year Present-Worth): $367,670

A detailed summary of the cost estimate for this alternative is provided in Table 2-6.

The major cost drivers of this remedial alternative are the sampling, analysis, and reporting associated with long-term monitoring and institutional controls. A major source of uncertainty for this cost estimate is the duration of the Long-Term Monitoring Program.

COMPONENTS AND EXPECTED OUTCOME OF REMEDIAL ALTERNATIVES

Component	**Alternative 1** No Action	**Alternative 2** Institutional Controls with Groundwater Monitoring
COMPONENTS OF REMEDIAL ALTERNATIVES		
Treatment Technologies	None	Institutional controls and monitoring
Containment Components	None	None
Institutional Controls	None	Land use restrictions to prevent contact with impacted media
Operations and Maintenance	None	Maintain monitoring network
Monitoring Requirements	None	Assess and track concentration trends, and plume location
Five-Year Review for 10 Years	Yes[(a)]	Yes

(a) Alternative 1 is based on a 20-year period.

COMPONENTS AND EXPECTED OUTCOME OF REMEDIAL ALTERNATIVES		
Component	**Alternative 1** No Action	**Alternative 2** Institutional Controls with Groundwater Monitoring
EXPECTED OUTCOME OF REMEDIAL ALTERNATIVES		
Land Use Following Remediation	Industrial or residential	Industrial or residential
Duration of Remedy	Not applicable	Determined based on five-year reviews
Available Groundwater Use Following Remediation	None	None
EXPECTED COST		
10-Year Projected	$18,000*	$367,670
* Alternative 1 is based on a 20-year period.		

4. Summary of Remedial Alternatives

Component	**Alternative 1** No Action	**Alternative 2** Institutional Controls with Groundwater Monitoring
Treatment Technologies	None	Institutional controls with groundwater monitoring
Containment Compounds	None	None
Institutional Controls	None	Land use restrictions to prevent contact with impacted media
Monitoring Requirements	None	Assess degree of natural attenuation, track concentration trends, and plume location
Five-Year Review	Yes	Yes
EXPECTED OUTCOME OF REMEDIAL ALTERNATIVE		
Land Use Following Remediation		Industrial or residential
Duration of Remedy	Not applicable	Determined based on five-year review
Available Groundwater Use Following Remediation	None	None
Expected Projected 10-Year Cost	$18,000*	$367,670
* Alternative 1 expected project cost is for 20 years.		

X. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 121(b)(1) of CERCLA presents several factors that, at a minimum, EPA is required to consider in its assessment of alternatives. Building upon these specific statutory mandates, the National Contingency Plan articulated nine evaluation criteria to be used in assessing the individual remedial alternatives.

A. Evaluation Criteria Used for Comparative Analysis

A detailed analysis was performed on the alternative using the nine evaluation criteria in order to select a site remedy. The following is a summary of the comparison of each alternative's strength and weakness with respect to the nine evaluation criteria. These criteria are summarized as follows.

1. Threshold Criteria

The two threshold criteria described below must be met in order for the alternative to be eligible for selection in accordance with the National Contingency Plan:

a. **Overall protection of human health and the environment** addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

b. **Compliance with ARARs** addresses whether or not a remedy will meet all of the ARARs of other federal and state environmental laws and/or provide grounds for invoking a waiver.

2. Primary Balancing Criteria

The following five criteria are utilized to compare and evaluate the elements of one alternative to another that meet the threshold criteria:

1. **Long-term effectiveness and permanence** assesses alternatives for the long-term effectiveness and permanence they afford, along with the degree of certainty that they will prove successful.

2. **Reduction of toxicity, mobility, or volume through treatment** addresses the degree to which alternatives employ recycling or treatment that reduces toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the site.

3. **Short-term effectiveness** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until cleanup goals are achieved.

4. **Implementability** addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

5. **Cost** includes estimated capital and operation and maintenance costs, as well as present-worth costs.

3. Modifying Criteria

1. **State acceptance** addresses the State's position and key concerns related to the preferred alternative and other alternatives, and the State's comments on ARARs or the proposed use of waivers.

2. **Community acceptance** addresses the public's general response to the alternatives described in the Proposed Plan and Remedial Investigation/Feasibility Study report.

Following the detailed analysis of each individual alternative, a comparative analysis, focusing on the relative performance of each alternative against the nine criteria, was conducted, as shown below:

Criteria	**Alternative 1** No Action	**Alternative 2** Institutional Controls with Groundwater Monitoring
1. Overall protection of human health and the environment	Poor	Moderate
2. Compliance with ARARs	Moderate	Good
3. Long-term effectiveness and permanence	Moderate (no treatment)	Moderate (no treatment)
4. Reduction of toxicity, mobility, or volume through treatment	Poor (no treatment)	Poor (no treatment)
5. Short-term effectiveness	Moderate	Moderate
6. Implementability	Good	Good
7. Cost	$18,000	$367,670
8. State acceptance	Not acceptable	Acceptable
9. Community acceptance	Not acceptable	Acceptable
NOTE: **Good** indicates the alternative meets the intent of the criteria. **Moderate** indicates the alternative partially meets the intent of the criteria. **Poor** indicates the alternative does not meet the intent of the criteria.		

B. Summary of the Comparative Analysis

The section below presents the nine criteria and a brief narrative summary of the alternative and the strengths and weaknesses according to the detailed and comparative analysis. Only those alternatives which satisfied the first two threshold criteria were balanced and modified using the remaining seven criteria.

1. Overall Protection to Human Health and the Environment

This criterion addresses each alternative's ability to provide protection to human health and the environment and describes how risks are reduced, controlled, or eliminated through engineering or institutional controls.

- Alternative 1 provides limited protection to human health and the environment, as it does not prevent possible contact with contaminants.

- Alternative 2 best fulfills these criteria as it establishes institutional controls to limit human contact with impacted groundwater, thus reducing or eliminating potential for human health hazards. The alternative implements a program to monitor potential risks to human health or the environment which can occur over time, such as contaminant migration.

2. Compliance with Applicable or Relevant and Appropriate Requirements

- Alternative 1 does not comply with ARARs as hazardous chemical contaminants will remain onsite with no action.

- Alternative 2 complies with the above ARARs through the utilization of groundwater monitoring and comparing analytical results of State MEGs and Federal MCLs. Remediation goals include reducing contaminant levels to below federal and state standards and minimizing carcinogenic and non-carcinogenic compounds so that the risk factors are below federal requirements (cancer risk factor between 1×10^{-4} and 1×10^{-6} and hazard index less than 1.0) and state guidelines (cancer risk of less than 1×10^{-5} and hazard index less than 1.0).

3. Long-Term Effectiveness and Permanence

This criterion refers to the ability of a remedial action to protect human health and the environment over time.

- Alternative 1 would provide no long-term effectiveness.

- Alternative 2 would provide the greatest long-term effectiveness. Alternative 2 would provide institutional controls to limit exposure in the long-term and monitor the changes in chemical concentration and migration over time. This would effectively provide information as to the progress of remediation and provide a warning system should contaminants migrate to areas/media that could be harmful to human health or the environment.

4. Reduction in Toxicity, Mobility, or Volume through Treatment

This criterion addresses the performance of treatment technologies implemented by the remedial action.

- Alternatives 1 and 2 do not utilize an engineered treatment method.

5. Short-Term Effectiveness

Short-term effectiveness deals with the period of time needed to achieve remediation goals, including any deleterious impacts that may be caused by the construction and implementation period.

- Alternative 1 would have no short-term effectiveness.

- Alternative 2 provides the best short-term effectiveness. No adverse impacts will occur during the implementation of this remedy since there is no construction phase.

6. Implementability

Implementability addresses the technical and administrative feasibility of a remedial action.

- Alternative 1 provides the best implementability because no action will be instituted.

- Alternative 2 provides good implementability as it utilizes an institutional control process and monitoring will be conducted in accordance with the Long-Term Monitoring Program that will be established for the site. Additionally, Site 7 is located within an active Naval Installation.

7. Cost

This criterion estimates the monetary cost of the proposed alternatives over a 20-year period for Alternative 1 and a 10-year period for Alternative 2.

- Alternative 1 has the least cost (estimated at $18,000)
- Alternative 2 is estimated to be $367,670.

8. State Acceptance

This criterion includes the state/support agency preference, comments, and/or support of the selected remedial alternative.

- Alternative 1—Not acceptable
- Alternative 2—Acceptable, the state agrees with the Navy's selection.

9. Community Acceptance

This criterion includes the community preference, comments, and/or support of the selected remedial alternative:

- Alternative 1—Not acceptable
- Alternative 2—Acceptable.

XI. THE SELECTED REMEDY

Alternative 2 (Institutional Controls with Groundwater Monitoring) is the selected remedy for Site 7. This remedy is not comprehensive in that it does not utilize source control and/or management of migration. However, it should be noted that no identified source of contamination is present, and monitoring results to date do not show that any offsite migration of COCs above Federal MCLs or State MEGs exists. An expected outcome of the selected remedy is that Site 7 will no longer present an unacceptable risk to humans via dermal contact or ingestion with no changes to the current site use. If, in the future, the site use were to change

(i.e., to residential use), the Navy would issue a memo to the RAB for review and comment, and to EPA and MEDEP for review, comment, and finalization in accordance with the Federal Facility Agreement detailing the tasks to be completed to remove the shallow soil that has concentrations of PAHs and DDT. The removal would be conducted according to applicable federal and state laws and regulations and the Federal Facility Agreement. Once the soil has been removed from the site, the Navy would modify or revise the Site 7 ROD in accordance with applicable federal laws, regulations, and the Federal Facility Agreement and will modify the institutional controls instrument according to its terms to remove the institutional controls for soils at the site. The selected remedy will treat the low level threats associated with site contaminants. The amount of time necessary to achieve the goals consistent with groundwater use is estimated to be up to 10 years.

Beginning in Fiscal Year 2003, the Navy will evaluate different technologies, i.e., phytoremediation or groundwater neutralization, to optimize the groundwater remedy at Site 7 in order to accelerate the closure of this site. The Navy will report the findings to the RAB for review and comment, and to EPA and MEDEP for review and consultation.

A. Groundwater Cleanup Levels

Target cleanup concentrations are less than 5 µg/L for cadmium and 200 µg/L for manganese, and are equivalent to the Federal MCLs and State MEGs.

B. Soil Cleanup Levels

No cleanup levels for soil have been established for Site 7.

C. Description of Remedial Components

As part of the Remedial Action Plan, a Long-Term Monitoring Plan will be developed and implemented to monitor natural attenuation of cadmium and manganese in groundwater. The Long-Term Monitoring Plan will be submitted to the RAB for review and comment, and to EPA and MEDEP for review, comment, and finalization in accordance with the Federal Facility Agreement. The Navy will continue the monitoring program in accordance with the Long-Term Monitoring Plan until it is determined that the program is no longer necessary. The Navy will make this determination with the review and comment of the RAB and with the review and comment of EPA and MEDEP in accordance with the Federal Facility Agreement. The Navy and EPA have concluded that it is impracticable to remove and/or treat the COCs in a cost effective manner, beyond the remedial actions undertaken to date at Site 7. Thus, the selected remedial action does not satisfy the statutory preference for treatment that reduces toxicity, mobility, or volume as a principal element.

1. Long-Term Monitoring

Long-term monitoring will be conducted. A Long-Term Monitoring Plan will be developed and implemented by the end of 2003. The final cleanup levels for groundwater are below Federal MCLs and State MEGs. Groundwater concentrations will be compared to these criteria and the selected remedy will be continued until they are consistently achieved.
The monitoring program will be detailed in the Long-Term Monitoring Plan, and will include the following:

- Assessing whether contamination is migrating offsite
- Assessing contaminant trends of cadmium and manganese to determine the effectiveness of the natural attenuation processes
- Assessing variations in groundwater flow patterns
- Monitoring structural integrity of the groundwater monitoring wells.

The Long-Term Monitoring Plan may be revised based on the sample results with the review and comment of the RAB, and review and comment of the EPA and MEDEP in accordance with the Federal Facility Agreement.

2. Institutional Controls

- As part of the remedial action plan for the site, the Navy will implement institutional controls to prevent the use of and contact with site groundwater and soil at Site 7. These institutional controls will consist of groundwater and soil use restrictions per the current NAS Brunswick Operations Instructions in effect. The Operations Instructions are used to identify and screen environmental areas for inappropriate construction or development activities. The Navy will generate and provide a draft version of these groundwater and soil use restrictions to the RAB for review and comment, and to the EPA and MEDEP for review, comment, and finalization in accordance with the Federal Facility Agreement within 15 months after signature of this ROD. When finalized, the groundwater and soil use restrictions will be incorporated into the Operations Instructions and placed in the Administrative Record for Site 7. The Operations Instructions will not be modified in any way that affects these use restrictions or the Site 7 remedy. The institutional controls will be inspected, noted, verified, and reported during the Long-Term Monitoring Program to be implemented at Site 7 in accordance with the Federal Facility Agreement. The monitoring and reporting of institutional controls will be described in the Site 7 Long-Term Monitoring Plan that will be prepared and finalized pursuant to the Federal Facility Agreement as part of this Remedial Action Plan for this site within 15 months after the signature of this ROD.

The radius of the proposed institutional control is 225 ft that will include the locations of the Remedial Investigation test pits where PAHs and DDT were detected in the site soils (0-2 ft bgs). If, in the future, the Navy decides to change the site use to a residential type of use, it will submit a memo to EPA, MEDEP, and the RAB for review and comment detailing the soil removal actions that it will take to remove the soil containing PAHs and DDT in accordance with applicable laws and regulations and the Federal Facility Agreement. Once the soil has been removed from the site, the Navy will revise or modify the Site 7 ROD in accordance with applicable laws and regulations and will ensure that the institutional control instrument according to its terms will provide for the removal of the institutional controls for soils at the site.

- Should the Navy transfer or lease any real property affected by Site 7, whether or not as a result of base closure, the Navy will notify EPA and MEDEP in accordance with the Federal Facility Agreement and the RAB at least 60 days prior to the transfer or lease. In consultation with the EPA and MEDEP, the Navy will include appropriate provisions (i.e., restrictive covenants or other use restrictions such as institutional controls) in all documents that evidence the transfer or lease to prevent the use of and contact with site groundwater and soil. If the property is transferred, or the lease allows capital improvements, a technical evaluation of the effectiveness and appropriateness of the remedy will be undertaken considering long-term monitoring results to date, the proposed land use, and the fact that the Navy may no longer actively own or operate the property.

3. Five-Year Review

A review will be completed every 5 years, pursuant to the Federal Facility Agreement, to evaluate the progress and effectiveness of the remedial action and to ensure that human health and the environment continue to be protected. Data collected during the Long-Term Monitoring Program will be reviewed, and recommendations for modifications will be made as part of each monitoring event report and in the five-year reviews. The five-year review process shall remain effective until institutional controls are no longer required at the site.

4. Applicable or Relevant and Appropriate Requirements

Appendix B includes a detailed analysis of the ARARs that are listed below.

a. Federal Relevant and Appropriate Requirements

Chemical-Specific:

- Safe Drinking Water Act – MCLs (40 CFR 141.11–141.16) (U.S. EPA 1999)
- Safe Drinking Water Act – MCL Goals (40 CFR 141.50 –141.51).

Action-Specific:

- Resource Conservation and Recovery Act Identification and Listing of Hazardous Waste Toxicity Characteristics (40 CFR 261.24).

b. State Relevant and Appropriate Requirements

Chemical-Specific:

- Maine Department of Human Services Rules Relating to Drinking Water (10-144E, Chapters 231-233)

- Maine Department of Human Services Rules Relating to Testing of Private Water Systems for Potentially Hazardous Contaminants (10-144A Code of Maine Regulations Chapter 233, Appendix C)

- Maine Hazardous Waste Rules Relating to Performance Standards for Establishing, Constructing, Altering, and Operating Certain Types of Hazardous Waste Units (06-096 CMR 854)

- 38 M.R.S.A. 465-C, Maine Classification of Waters Program – Groundwater and Classification of Maine Waters (§464 (4)(A)(1).

Action-Specific:

- Maine Surface Water Toxics Control Program (38 MRSA Sections 420, 464, 06-096 CMR-530)

- Maine Hazardous Waste Rules Relating to Performance Standards for Establishing, Constructing, Altering, and Operating Certain Types of Hazardous Waste Units (06-096 CMR 854)

- Maine Solid Waste Management Rules – General Provisions (06-096 CMR 400)

- Maine Solid Waste Management Rules – Water Quality Monitoring, Leachate Monitoring, and Waste Characterization (06-096 CMR 405).

To Be Considered:

- EPA Risk Reference Doses (U.S. EPA 1999)

- EPA Human Health Assessment Group Cancer Slope Factors (U.S. EPA 1999)

- Guidance Manual for Conducting Human Health Risk Assessment at Hazardous Substance Sites (June 1994)

- Draft Interim MEGs (Bureau of Health, Maine Department of Human Services, 3 January 2000)

- MEDEP, Draft Implementation of Remedial Action Guidelines (June 1997).

5. Outcomes

After completion of the remedial action, groundwater at Site 7 will no longer present a hazard to human health or the environment if it is used as a drinking water source.

During operation of the remedy, human health and the environment will be protected from unacceptable risks due to contact with cadmium and manganese in the groundwater and with the site soils.

If excavations are required, proper hazardous material handling will be in accordance with OSHA, Navy procedures, the Base Operations Instructions, and ARARs with review and consultation by EPA and MEDEP.

XII. STATUTORY DETERMINATIONS

The remedial action selected for implementation at Site 7 is consistent with CERCLA and, to the extent practicable, the National Contingency Plan. The selected remedy is protective of human health and the environment, will comply with ARARs, and is cost effective. In addition, the selected remedy utilizes permanent solutions and alternate treatment technologies or resource recovery technologies to the maximum extent practicable.

Beginning in Fiscal Year 2003, the Navy will evaluate different technologies, i.e., phytoremediation or groundwater neutralization, to optimize the remedy at Site 7 to accelerate the closure of this site. The Navy will report the findings to the RAB for review and comment and to EPA and MEDEP for review and consultation.

A. The Selected Remedy is Protective of Human Health and the Environment

The remedy at this site will adequately protect human health and the environment by eliminating, reducing, or controlling exposures to human and environmental receptors through natural chemical processes and institutional controls, and long-term monitoring.

The selected remedy will reduce potential human health risk levels to within EPA's acceptable risk range of from 10^{-4} to 10^{-6} for incremental carcinogenic risk and to below the hazard index of 1 for non-carcinogenic risk. It will reduce potential human health risk levels to protective ARARs levels, i.e., the remedy will comply with ARARs and To Be Considered criteria. Implementation of the selected remedy will not pose any unacceptable short-term risk or cause any cross-media impacts.

B. The Selected Remedy Complies with Applicable or Relevant and Appropriate Requirements

The selected remedy will comply with all federal and any more stringent state ARARs that pertain to the site. In particular, this remedy will comply with the following federal ARARs:

1. Safe Drinking Water Act MCLs (40 CFR 141.11-141.16) (U.S. EPA 1999)

2. Safe Drinking Water Act MCL Goals (40 CFR 141.50-141.51)

3. Resource Conservation and Recovery Act Identification and Listing of Hazardous Wastes; Toxicity Characteristics (40 CFR 261.24).

This remedy will also comply with the following State ARARs:

1. Maine Department of Human Services Rules Relating to Drinking Water (10-144E Chapters 231-233)

2. Maine Department of Human Services Rules Relating to Testing of Private Drinking Water Systems or Potential Hazardous Contaminants (10-144E Chapters 232-233, Appendix B)

3. Maine Hazardous Waste Rules Relating to Performance Standards for Establishing, Construction, Altering, and Operating Certain Types of Hazardous Waste Units (06-096-CMR-854)

4. Maine Surface Water Toxics Control Program (38 MRSA Sections 420, 464; 06-096 CMR 530)

5. Maine Solid Waste Management Rules – General Provisions (06-096 CMR 400)

6. Maine Solid Waste Management Rules – Water Quality Monitoring, Leachate Monitoring, and Waste Characterization (06-096 CMR 405)

7. Guidance Manual for Conducting Human Health Risk Assessment at Hazardous Substance Sites (June 1994)

8. 38 M.R.S.A. 465-C, Maine Classification of Waters Program – Groundwater and Classification of Maine Waters (§464 (4)(A)(1).

The Navy would use EPA Risk Reference Doses (U.S. EPA 1999) and EPA Human Health Assessment Group Cancer Slope Factors (U.S. EPA 1999), and Maine Draft Interim MEGs (MEDHS 2000) and Draft Implementation of Remedial Action Guidelines (MEDEP 1997) as To Be Considered criteria for characterizing risk from inorganics in groundwater.

C. The Selected Remedial Action is Cost Effective

The selected remedy is cost effective because the remedy costs are proportional to its overall effectiveness (40 CFR 300.430[f][1][ii][D]). This determination was made by evaluating the overall effectiveness of those alternatives that satisfied the threshold criteria (i.e., that are protective of human health and the environment and comply with all federal and any more stringent ARARs, or as appropriate, waive ARARs). Overall effectiveness was evaluated by assessing 3 of 5 balancing criteria; long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness, in combination. The overall effectiveness of each alternative was compared to the alternative's cost to determine cost effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and hence represents a reasonable value for the money to be spent.

D. The Selected Remedy Utilizes Permanent Solutions and Alternative Treatment or Resource Recovery Technologies to the Maximum Extent Practicable

The Navy first identified those alternatives that are protective of human health and the environment by meeting or waiving ARARs as appropriate, and then identified which alternatives utilized permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. This determination was made by deciding which one of the identified alternatives provides the best balance of trade-offs among alternatives in terms of: (1) long-term effectiveness and permanence; (2) reduction of toxicity, mobility, or volume through treatment; (3) short-term effectiveness; (4) implementability; and (5) cost. The balancing test emphasized long-term effectiveness and permanence and the reduction of toxicity, mobility, and volume through treatment; and considered the preference for treatment as a principal element, the bias against offsite land disposal of untreated waste, and community and state acceptance. The selected remedy provides the best balance of trade-off among the alternatives.

The selected remedial action does not utilize permanent solutions and alternative treatment or resource recovery technologies because they are not the most practicable for this site. Contamination at Site 7 does not pose an immediate threat to human health that would require active remediation. The institutional controls that will be implemented as part of the remedy rely on natural chemical processes to dilute and degrade chemical contaminants over time. This remedy, when compared to the active remediation alternative, had the highest balance of trade-offs.

Beginning in Fiscal Year 2003, the Navy will evaluate different technologies, i.e., phytoremediation or groundwater neutralization, to optimize the groundwater remedy at Site 7 to accelerate the closure of this site. The Navy will report the findings to the RAB for review and comment and to EPA and MEDEP for review and consultation.

E. The Selected Remedy Does Not Satisfy the Preference for Treatment which Permanently and Significantly Reduces the Toxicity, Mobility, or Volume or the Hazardous Substances as a Principal Element

The Navy and EPA have concluded that it is impracticable to remove and/or treat the COCs in a cost effective manner, beyond the remedial actions undertaken to date at Site 7. Thus, the selected remedial action does not satisfy the statutory preference for treatment that reduces toxicity, mobility, or volume as a principal element. However, as groundwater at Site 7 is not used as drinking water and there is no significant potential groundwater source, potential danger to human health or the environment is not immediate. Given the low concentrations and recent source area removal, it is expected that the low levels of cadmium and manganese will naturally attenuate and that monitoring will not be a long-term requirement.

F. Five-Year Review Requirements

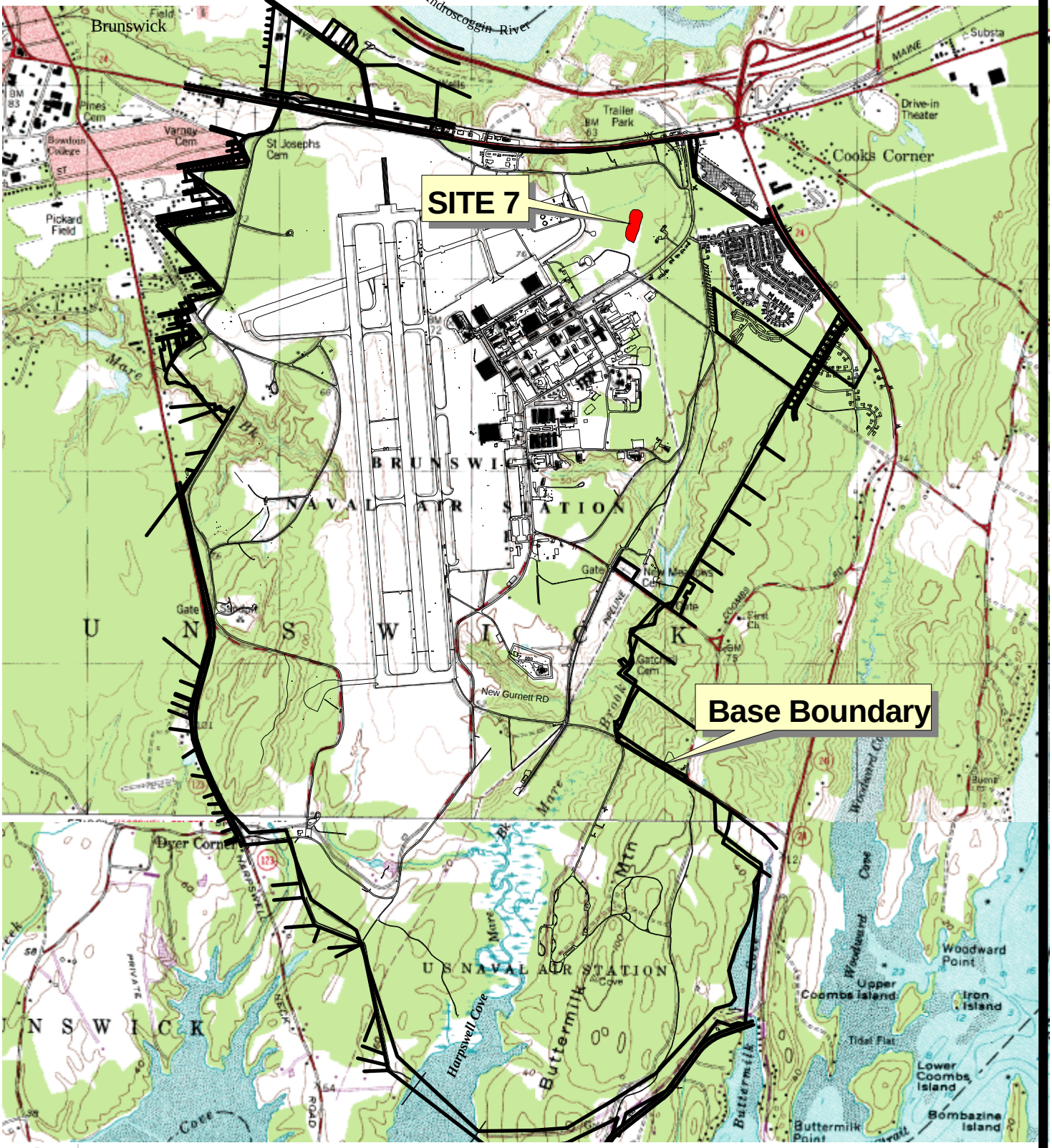
This remedy will result in hazardous substances remaining onsite above levels that allow for unlimited use and unrestricted exposure. A review will be conducted within 5 years after initiation of the remedial action and at least every 5 years thereafter to ensure that the remedy continues to provide adequate protection of human health and the environment. The five-year review process shall remain effective until institutional controls are no longer required at the site.

XIII. DOCUMENTATION OF NO SIGNIFICANT CHANGES

The Navy presented a Proposed Plan of institutional controls with groundwater monitoring for remediation of Site 7 on 9 April 2002. EPA reviewed all written and verbal comments submitted during the public comment period. It was determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary.

XIV. STATE ROLE

MEDEP has reviewed the various alternatives and has indicated its support for the selected remedy. The State has also reviewed the Remedial Investigation, Risk Assessment, and Feasibility Study to determine if the selected remedy is in compliance with ARAR state environmental laws and regulations. MEDEP concurs with the selected remedy for Site 7. A copy of the declaration of concurrence by MEDEP is provided as Appendix C.



SOURCE MAPS: USGS ORRS ISLAND (1978) AND BRUNSWICK (1980) 7.5 MINUTE QUADRANGLES.

EA ENGINEERING, SCIENCE, AND TECHNOLOGY

SITE 7
NAVAL AIR STATION
BRUNSWICK, MAINE

FIGURE 2-1
SITE LOCATION MAP

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT No	FILE No
ACE	JG	JG	ACE	AS SHOWN	SEPT 2002	29600.82	I:\NASB_GIS \NAVY.APR